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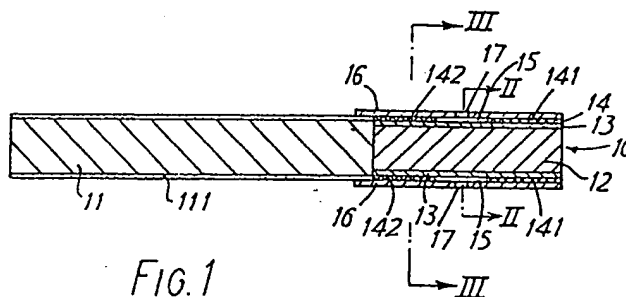
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(58) Field of search

A2C

(54) Tipping assembly for an elongate smoking article

(57) A ventilated circumferential cavity (15) in a cigarette filter tip is formed by providing an elongate web of tipping paper (16) with a series of ventilating apertures (17) lying parallel to the longitudinal axis of the web, printing onto the web elongate areas (141, 142) of polyvinyl chloride up to 0.3 mm thick either side of and parallel to the vents, and applying the coated web to a filter rod so that the printed areas define a circumferential cavity (15) between the tipping paper and the filter rod.



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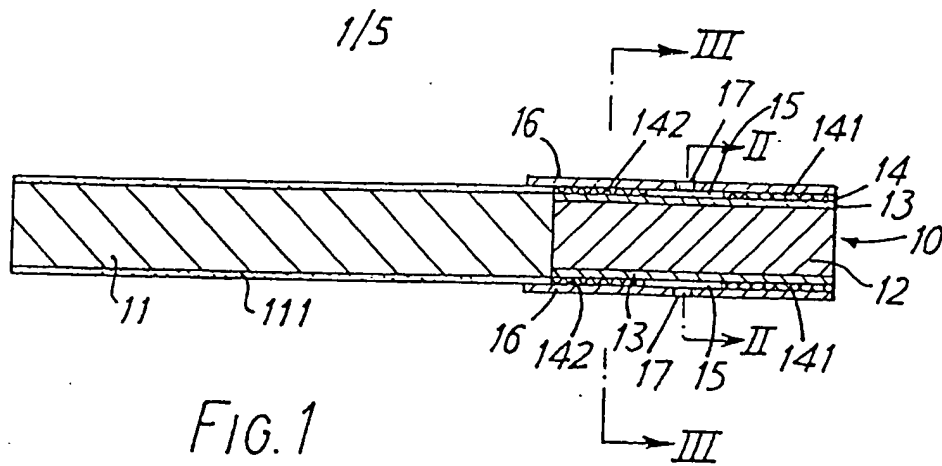


FIG. 1

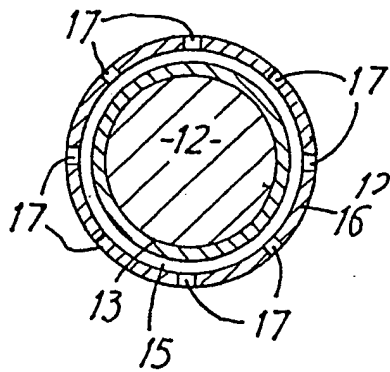


FIG. 2

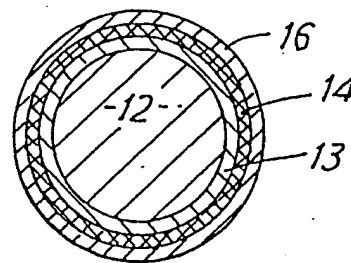


FIG. 3

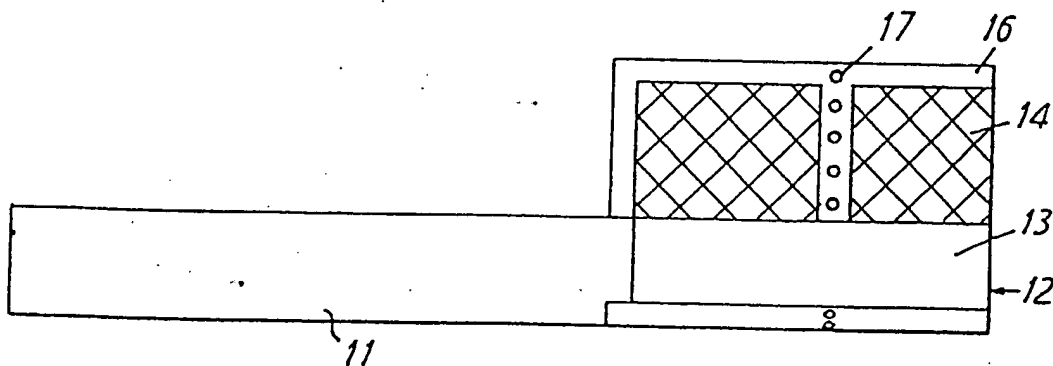


FIG. 4

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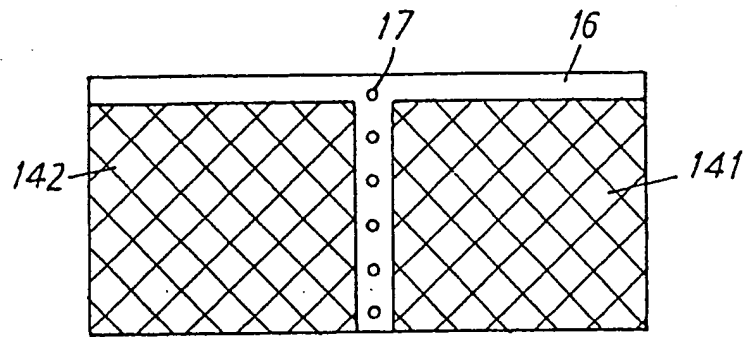


FIG. 5

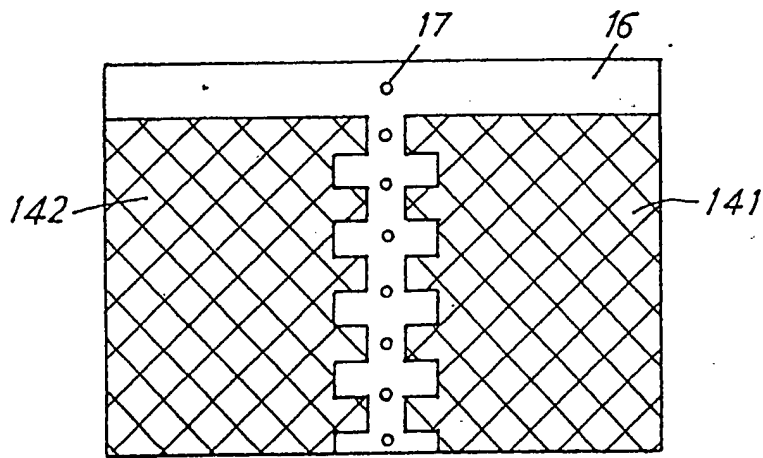
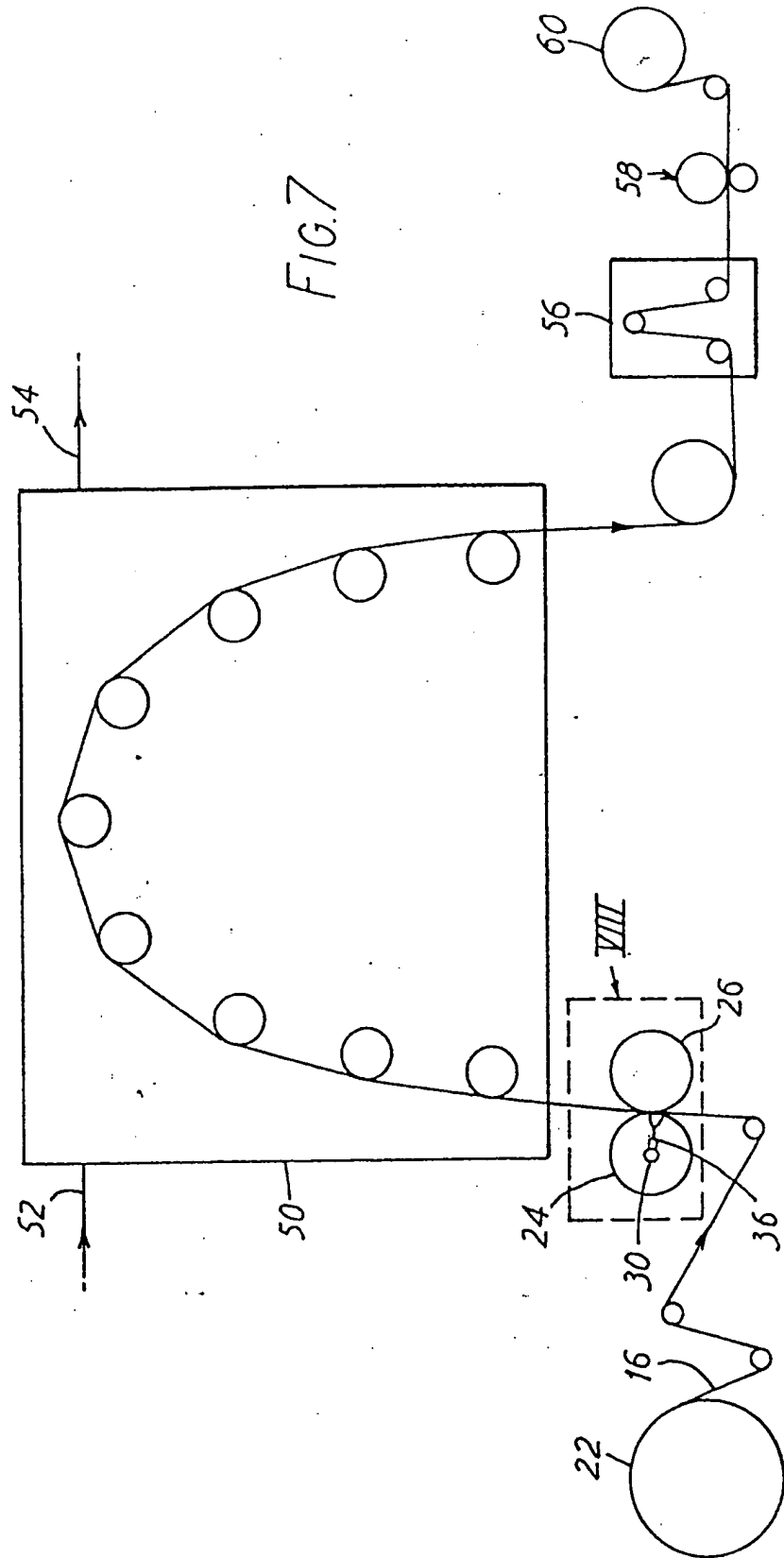


FIG. 6

FIG. 7



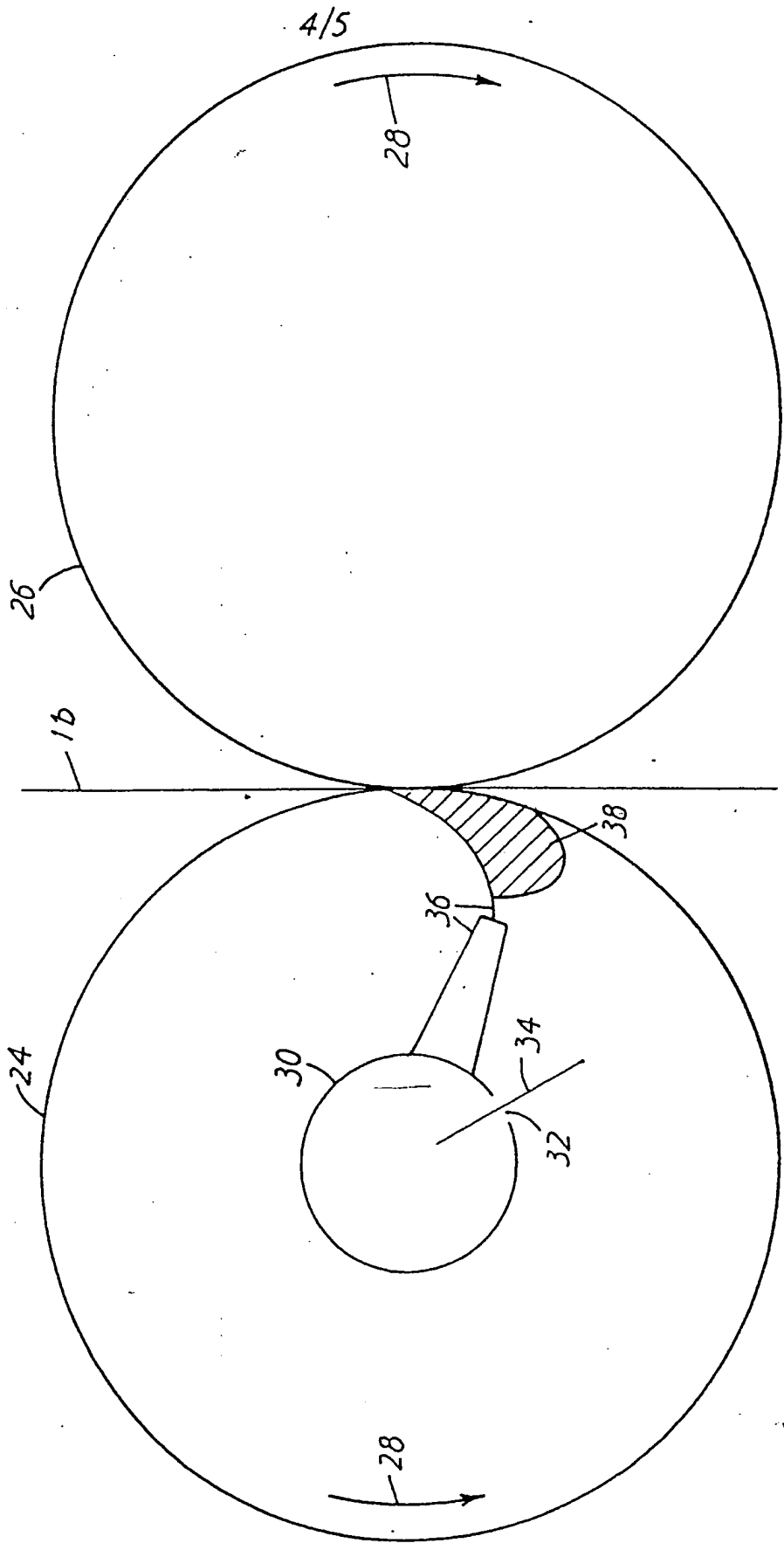


FIG.8

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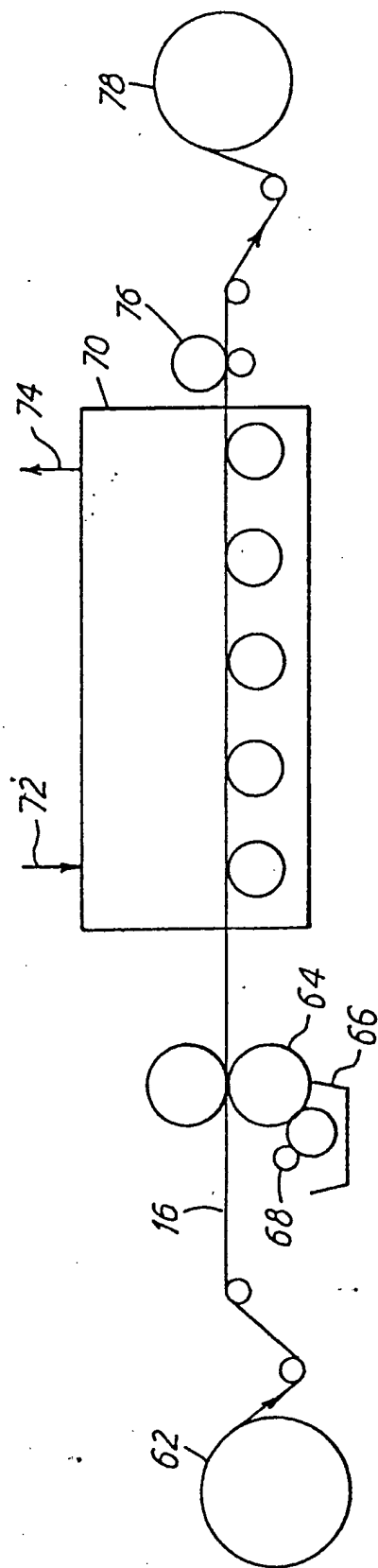


FIG. 9

SPECIFICATION

Tipping assembly for an elongate smoking article

5 This invention relates to a tipping assembly for an elongate smoking article, in particular to a ventilated filter tip for a cigarette or the like, and to a method of making such a tipping assembly. 5

In British Patent No. 1602962 there is disclosed a tobacco smoke filter comprising a body of tobacco smoke filtering material, a wrapper forming a tubular wall around the body, at least one cavity defined by and substantially wholly enclosed by the body and the wrapper and extending to the tubular wall, and
10 air-permeable means in the wrapper allowing direct passage of external ventilating air into the cavity or cavities through the wrapper. Such a filter will hereinafter be referred to as "of the type described". 10

It is an object of the present invention to provide an improved tipping assembly of the type described having ventilation means venting ambient air into a cavity, in which the size and shape of the cavity and the registration of the ventilation means with the cavity can be easily controlled at the manufacturing stage.

15 According to a first aspect of the present invention there is provided a tipping assembly for an elongate smoking article, the assembly comprising, 15

(a) a cylindrical plug of filter material having a porous surface, and,

(b) a tipping wrapper surrounding the plug and adapted to permit the passage of ventilating air through the tipping wrapper,

20 wherein two distinct cylindrical regions of that surface of the tipping wrapper facing the plug, said cylindrical regions being separated by an annular zone of the wrapper, are each printed with a raised area of air-impervious plastics material of predetermined thickness, the raised areas together with said annular zone defining an annular cavity between the tipping wrapper and the plug, whereby ambient air is able to pass through the tipping wrapper into the annular cavity and thence into the plug. 20

25 According to a second aspect of the present invention there is provided a method of making a tipping assembly according to the first aspect, the method comprising, 25

(a) providing a cylindrical filter plug having a porous surface,

(b) providing an elongate web of tipping wrapper material,

(c) printing on the web first and second elongate raised areas of predetermined thickness of air impervious plastics material on either side of and parallel to a zone of the web extending parallel to the longitudinal axis of the web, 30

(d) wrapping the web round the plug so that the printed areas face the plug and together with said zone define an annular cavity extending circumferentially round the plug, and,

(e) providing said zone with means to admit ventilating ambient air to the annular cavity.

35 According to a third aspect of the present invention there is provided an elongate web of tipping material for a smoking article filter plug, the web being provided with printed elongate raised areas of predetermined thickness of air-impervious plastics material on either side of and parallel to a zone of the web extending parallel to the longitudinal axis of the web, said zone being permeable to air. 35

According to a fourth aspect of the present invention there is provided a tobacco rod in combination with a tipping assembly according to the first aspect. 40

The plastics material is preferably a thermoplastic resin, such as polyvinyl chloride.

The thickness of each area of plastics material is preferably in the range 0.05 - 0.3 mm.

The tipping wrapper is preferably adapted to permit the passage of ventilating ambient air by means of at least one ventilation aperture.

45 A permeable plug wrapper may be provided on the surface of the filter plug. 45

The invention will now be described by way of example only with reference to the accompanying diagrammatic drawings in which,

Figure 1 is a longitudinal section through a tipping assembly according to the invention, when attached to a tobacco rod;

50 *Figure 2* is a cross-section through the assembly of *Figure 1* taken at the line II-II; 50

Figure 3 is a cross-section through the assembly of *Figure 1* taken at the line III-III;

Figure 4 is a partly exploded view of an embodiment of the assembly shown in *Figure 1*;

Figures 5 and *6* are plan views of first and second embodiments of a tipping wrapper used in the invention;

Figure 7 is a schematic cross-section of a rotary screen printing machine for printing a raised area on a tipping wrapper; 55

Figure 8 is a detail enlargement of that portion of *Figure 7* enclosed in chain line VIII; and;

Figure 9 is a schematic cross-section of a gravure printing machine for printing a raised area on a tipping wrapper.

With reference to *Figures 1* to *3* there is shown a cigarette filter 10 attached (as shown in *Figure 1*) to a tobacco rod 11 encased in cigarette paper 111. The filter 10 comprises a cylindrical plug 12 of fibrous material, typically cellulose acetate, encased in a highly porous plug wrap 13 of porosity value 650 Filtrona K units, which are defined hereinafter. 60

Surrounding the plug wrap 13 is a paper tipping wrapper 16 which is coated on the side facing the plug wrap 13 with two raised areas 141, 142 about 0.1 mm thick of polyvinyl chloride (hereinafter referred to as

PVC) separated one from the other by an annular gap 15, so that the uncoated portion of the wrapper between the raised areas is separated from the plugwrap by a distance of about 0.1 mm. Thus there is provided an annular circumferential cavity, also referred to by numeral 15, between the tipping wrapper and the plug wrap.

- 5 The tipping wrapper is provided with a circumferential series of ventilating perforations 17 which overlie the cavity 15 and thereby permit ambient ventilating air to pass through the perforations 17, through the cavity 15, and then through the porous plug wrap 13 into the filter plug 12. 5

In a method for making the tipping assembly of the invention a continuous web 16 of tipping wrapper paper is provided with a longitudinal series of ventilating perforations 17 in a manner common in the art.

- 10 Two areas of PVC lying parallel to the longitudinal axis of the web and either side of the perforations are printed onto the web to a thickness of about 0.1 mm by a method such as one of those described in our British Patent Application No. 2112264A, as follows. 10

Figures 7 and 8 show a rotary screen process for printing raised areas of PVC on cigarette tipping wrapper paper, otherwise known as cork tipping paper.

- 15 A web 16 of tipping wrapper paper is held prior to use on a reel 22. Tracking devices (not illustrated) are provided to control the tension of the web 16. From reel 22 the web passes to a gap between a rotary screen 24 and a backing roll 26 rotating in the direction of arrows 28, where the desired area of PVC is deposited on the paper. The PVC is extended with fillers, and care must be taken with the rheological properties to ensure that an even and sharply defined deposit is formed. 15

- 20 The PVC printing material in fluid form is fed to the screen 24 by passing the printing material axially through a fixed hollow axle 30, round which the screen rotates, radially outwards through an aperture 32 in the wall of the axle in the direction of arrow 34, and then forcing the material through the screen 24 by an adjustable squeegee 36. The material being forced through the screen 24 by the squeegee 36 is shown by the shaded area 38 in Figure 8. By adjustment of the gap between the screen 24 and backing roll 26, and by adjustment of the angle and pressure of the squeegee 36 the depth of the deposit may be accurately controlled. 20 25

- The printed web 16 then passes through a drying oven 50 provided with a hot air inlet and exhaust 52,54 respectively, where the drying of the pattern is accurately controlled. After drying, the web 16 passes through a cooling section 56 and thence to a registration mark printing unit 58, such marks being required during a subsequent cigarette tipping operation. Finally, the web is wound on a rewind reel 60 containing tension controlling and tracking devices. The printed web may subsequently be slit on the reel to provide bobbins of required widths and diameters. 30

Figure 9 shows a gravure process for printing raised areas of PVC on tipping wrapper paper.

- A web 16 of tipping wrapper paper is held prior to use on a reel 62. Tracking devices, not illustrated, are provided to control lateral positioning of the web. Likewise, braking devices, not illustrated, are provided to control the tension of the web 16. From reel 62 the web passes to a gravure roll 64 where the required areas of PVC are deposited on the paper. The gravure roll itself has etched on to its surface in the form of small hollows of pyramidal or like shape the pattern necessary to provide the required areas of PVC on the paper. The size and depth of the hollows, together with the rheological properties of the PVC to be deposited, critically affects the quality and thickness of deposit achieved. The transfer of material for deposition from a reservoir 66 to the gravure roll 64 is controlled by a series of transfer and metering rolls 68. 35 40

- After the printing process the web 16 passes through a drying tunnel 70 that is provided with hot air inlet and exhaust 72,74 respectively, where the deposit is thoroughly dried. The drying tunnel 70 may take a number of different forms and is likely to be either steam or gas heated. The drying temperature must be accurately controlled for satisfactory results. The drying tunnel may include a cooling section (not illustrated). 45

After drying and cooling the web 16 passes through a registration mark printing unit 76 which provides registration marks necessary for the cigarette tipping operation. The printed web is finally wound on to a rewind reel 78 containing controlling and tracking devices.

- 50 The printed web may subsequently be slit on the reel to provide bobbins of required widths and diameters on a standard paper slitting machine. 50

Although not essential, iron oxide or similar coloring material may be added to the printing material (PVC) so that the printed pattern may be readily visible on the web. This is convenient for subsequent handling and registration operations.

- 55 In an example, the printing material used was PVC based and had the following composition (percentages are by weight):- 55

	Liquid polyvinyl chloride	51.4	
	Diocetyl phthalate	20.6	
60	Microdol I (Reg. Trade Mark)	11.8	60
	Calcium stearate	1.0	
	Finnitan RF2 (Reg. Trade Mark)	8.7	
	White spirit	6.5	
		<u>100.0</u>	
65	Finnitan RF2 is titanium dioxide.		65

It will be understood that the thickness of the polyvinyl chloride printed onto the web 16 is accurately controllable by the printing technique as desired, and furthermore the registration of the printed areas of PVC with respect to the perforations 17 is also controllable to an equivalent degree of accuracy.

The shape of each area of PVC is determined by the printing technique. Figure 5, for example, shows a tipping wrapper web 16 in which the PVC comprises rectangular areas 141, 142 either side of the line of perforations 17; whilst in Figure 6 the edges of the areas 141, 142 of PVC immediately facing the perforations each have a crenellated configuration so as to enable ventilating ambient air to enter the filter plug over a larger area. This is useful for certain designs of filter having specific desired properties.

Figure 4 shows filter plug 12 wrapped in porous plug wrap 13 and joined to tobacco rod 11, being wrapped in tipping wrapper 16 which has been provided with printed areas of PVC either side of the perforations 17 in the tipping wrapper 16, as described with reference to Figure 5, so that the printed areas 14 separate the tipping wrapper from the plug wrapper 13.

The method of the invention thus enables a manufacturer of filter plugs for cigarettes and the like to control the shape and size of a circumferential cavity with a high degree of accuracy and reproducibility, and to control the registration of the cavity with respect to perforations or other markings in or on the tipping wrapper of the cigarette. Furthermore, the speed and cost effectiveness of the method of the invention is believed to be superior to that of other methods of providing a circumferential cavity in association with circumferential perforations, such as a circumferential cavity cut in the filter plug, or webs laminated to either the plug or to the tipping wrapper in order to provide the cavity.

The product of the invention, by virtue of the method by which it is made has a high degree of versatility in that the manufacturer is enabled to provide ventilated circumferential cavities to an unprecedented degree of accuracy to almost any design, and thus to modify the smoking and filtration characteristics of his filter cigarette as desired.

In alternative embodiments, not illustrated, the tipping paper may be provided with a region of high porosity, instead of a series of perforations. The whole of the tipping paper may indeed be highly porous.

The printed areas of PVC may be replaced by polyvinyl acetate or other similar plastics material that is impervious or impermeable to air.

The porosity of the plug wrapper may be substantially different from the exemplified value of 650 Filtrona K units. It may, for example, be in the region of 1000 Filtrona K units.

Designs of printed areas 14 other than those described above may be contemplated for specific circumstances.

A Filtrona K unit is a flow rate of 17.5 ml/sec/cm²/mm water gauge. References hereinabove to porosities in terms of Filtrona K units therefore signify porosities which generate the appropriate Filtrona K flow rates as defined above.

CLAIMS

1. A tipping assembly for an elongate smoking article, the assembly comprising,
 - (a) a cylindrical plug of filter material having a porous surface, and,
 - (b) a tipping wrapper surrounding the plug and adapted to permit the passage of ventilating air through the tipping wrapper,
 wherein two distinct cylindrical regions of that surface of the tipping wrapper facing the plug, said cylindrical regions being separated by an annular zone of the tipping wrapper, are each printed with a raised area of air-impervious plastics material of predetermined thickness, the raised areas together with said annular zone defining an annular cavity between the tipping wrapper and the plug, whereby ambient air is able to pass through the tipping wrapper into the annular cavity and thence into the plug.
2. A tipping assembly as claimed in claim 1 wherein the thickness of each area of plastics material is in the range 0.05 - 0.3 mm.
3. A tipping assembly as claimed in claim 1 or 2 wherein the plastics material is a thermoplastic resin.
4. A tipping material as claimed in claim 3 wherein the plastics material is polyvinyl chloride.
5. A tipping assembly as claimed in any preceding claim wherein the tipping wrapper is adapted to permit the passage of ventilating air by means of at least one ventilation aperture.
6. A tipping assembly as claimed in claim 5 wherein there is provided a plurality of ventilating apertures spaced round the periphery of the assembly.
7. A tipping assembly as claimed in any one of claims 1 - 4 wherein the tipping wrapper is provided with a region of high porosity overlying the annular cavity thereby to permit the passage of ventilating air into the cavity.
8. A tipping assembly as claimed in any preceding claim wherein a permeable plug wrapper is provided on the surface of the filter plug.
9. A method of making a tipping assembly as claimed in any preceding claim, the method comprising,
 - (a) providing a cylindrical filter plug having a porous surface,
 - (b) providing an elongate web of tipping wrapper material,
 - (c) printing on the web first and second elongate raised areas of predetermined thickness of air impervious plastics material on either side of and parallel to a zone of the web extending parallel to the longitudinal axis of the web,

- (d) wrapping the web round the plug so that the printed areas face the plug and together with said zone define an annular cavity extending circumferentially round the plug, and,
- (e) providing said zone with means to admit ventilating ambient air to the annular cavity.
10. A method as claimed in claim 9 wherein the printing is carried out by a rotary screen process.
- 5 11. A method as claimed in claim 9 wherein the printing is carried out by a gravure process. 5
12. A method as claimed in claim 9 including the step of controlling the thickness of the raised areas so that the annular cavity is 0.05 - 0.3 mm deep.
13. A method as claimed in claim 9 including the step of passing the printed web through a drying oven or tunnel and accurately controlling the drying temperature.
- 10 14. An elongate web of tipping material for a smoking article filter plug, the web being provided with printed elongate raised areas of predetermined thickness of air-impervious plastics material on either side of and parallel to a zone of the web extending parallel to the longitudinal axis of the web, said zone being permeable to air. 10
15. An elongate web as claimed in claim 14 wherein said zone is provided with perforations.
- 15 16. A tobacco rod in combination with a tipping assembly as claimed in any one of claims 1 to 8. 15
17. A tipping assembly for an elongate smoking article substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.
18. A method of making a tipping assembly for an elongate smoking article substantially as hereinbefore described with reference to Figures 4 to 9 of the accompanying drawings.
- 20 19. An elongate web of tipping material for a smoking article filter plug substantially as hereinbefore described with reference to Figures 5 or 6 of the accompanying drawings. 20